

**Corrective Action Status Meeting Agenda**  
**OxyChem – Wichita, KS**  
**April 18, 2017**

- I. Current Activities Update
  - A. IW System
    - 1. Air Stripper Installation
    - 2. Addition of IW-43
  - B. Semi-Annual Sampling
    - 1. Spring 2017 Event
  - C. VI Investigation Update
    - 1. On-Site Indoor Air
    - 2. On-Site Soil Gas
    - 3. Off-Site Soil Gas
  - D. Corrective Measures Schedule Discussion
    - 1. Human Health Risk Assessment Report
    - 2. Corrective Measures Study
- II. RCRA Permit Application Discussion
- III. Other Items
  - A. Hay Irrigation Request
  - B. Landfill Sampling

# Corrective Action Status Meeting

Oxy-Chem- Wichita, KS

April 18, 2017

# Outline

- Vapor Intrusion Work Plan Scope Review
- VI Investigation Results Summaries
  - Administration Building
  - On-Site Soil Gas
  - Off-Site Soil Gas
- HHRA Status and Path Forward
- CMS Status and Path Forward
- Summary

# Vapor Intrusion Work Plan Scope Review

- Administration Building
  - Active Interim Corrective Measure since 2011
  - Quarterly Pressure Monitoring & Inspections since 2011
  - System Operating as Designed
  - EPA Requested Supplemental Indoor Air Sampling in 2016
  - Two Locations/One Event – First Floor & Second Floor



# Vapor Intrusion Work Plan Scope Review

- On-Site Soil Gas Investigation
  - Evaluated ~150 Structures & Identified ~ 75 for Screening
  - Excluded Administration/Technical Center/Laboratory (current ICM in place)
  - Installed and Sampled 25 on-site soil gas ports ~5 ft bgs
  - Only one round of samples collected from five (5) locations:
    - Water in tubing
    - Vacuum in sampling train
- Obtained Representative Data to Support Corrective Action Decisions
  - Screened Data Using Criteria at 1E-06 to 1E-04 Cancer Risk and THQ 0.1

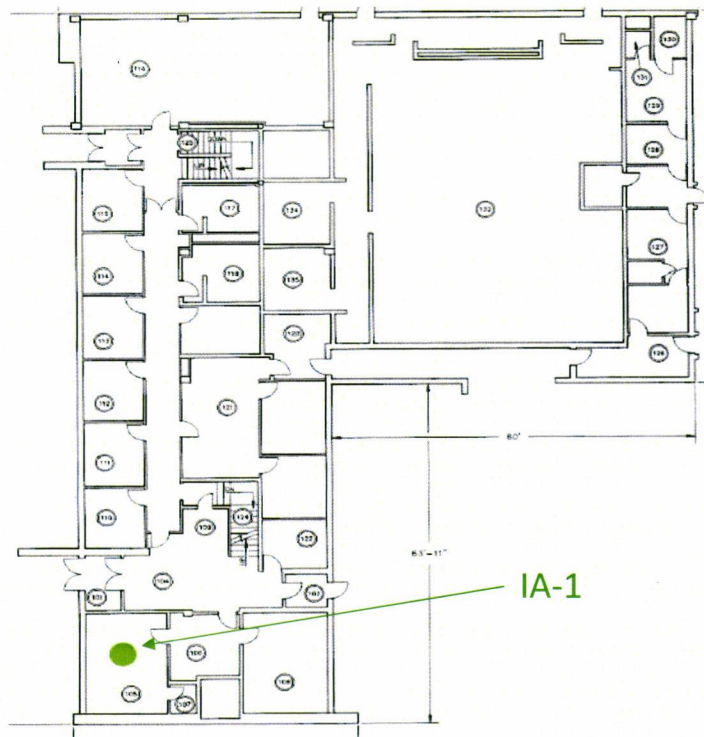
# Vapor Intrusion Work Plan Scope Review

- Off-Site Supplemental Soil Gas Investigation
  - Historic Soil Gas Data Collected 2008-2010
  - Soil Gas Monitoring Concluded with EPA Concurrence & No Additional Action (January 2011)
  - EPA Requested Additional Soil Gas Data in 2016
  - Soil gas sample collected near four off-site residences @ ~15 ft bgs
- Obtained Data During Two Events
  - Highly variable (anomalous) data between events
  - Screened Data Using Criteria at 1E-06 to 1E-04 Cancer Risk and THQ 0.1

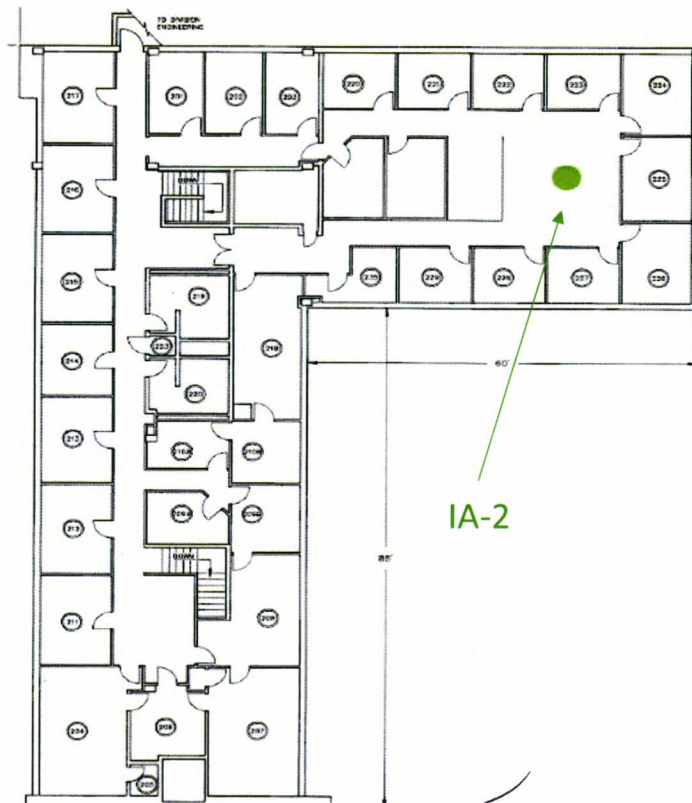
# On-Site Indoor Air – Analytical Results

- First Floor & Second Floor Results Nearly Identical
- Detected Chemicals/Degradation Products are/have been at the Site:
  - Detected: Carbon Tetrachloride, Chloroform, Methylene Chloride, PCE and TCE
- Detected concentrations are:
  - Similar to residential background indoor air
  - Below occupational indoor air criteria

# Administration Building Sample Locations



1st Floor



2nd Floor

Same concentrations  
both floors + dup  
chloroform barely exceeded



# Indoor Air Screening Table

All units in  $\mu\text{g}/\text{m}^3$

Volatile Organic Compounds	On RTK List	Manufactured	Used	EPA IA RSLs (TR = 1E-06, HI=0.1)	EPA IA RSLs (TR = 1E-05, HI=1)	OSHA PELs	First Floor IA-1 1/6/2017	First Floor FD-3 1/6/2017 (duplicate)	Second Floor IA-2 1/6/2017
1,1,1-Trichloroethane				2,200	22,000	1,900,000	1.1 U	1.1 U	1.1 U
1,2-Dichloroethane				0.47	4.7	80,000	0.81 U	0.81 U	0.81 U
1,2-Dichloropropane		x		1.2	12	350,000	0.92 U	0.92 U	0.92 U
Benzene				1.6	13.1	32,000	0.45 J	0.45 J	0.45 J
Carbon tetrachloride	x	x		2	20	60,000	1.7	1.1 J	1.6
Chloroform (Trichloromethane)	x	x	x'	0.53	5.3	240,000	1.6	1.3	1.7
Hexachlorobutadiene				0.56	5.6	--	2.1 U	2.1 U	2.1 U
Hexachloroethane				1.1	11	10,000	1.9 U	1.9 U	1.9 U
Methylene chloride	x	x		260	2,600	90,000	1.0 J	13 J	1.1
Tetrachloroethene		x		18	180	695,000	0.95	0.75	1.0
Trichloroethene				0.88	8.8	530,000	0.21 U	0.21 U	0.21 J
Vinyl chloride				2.8	28	1,200	0.51 U	0.51 U	0.51 U

X' = possibly present in indoor air due the use of bleach cleaners

Exceeds Regulatory EPA IA RSL; TR=1E-06; HI=0.1

# On-Site Indoor Air – Data Evaluation

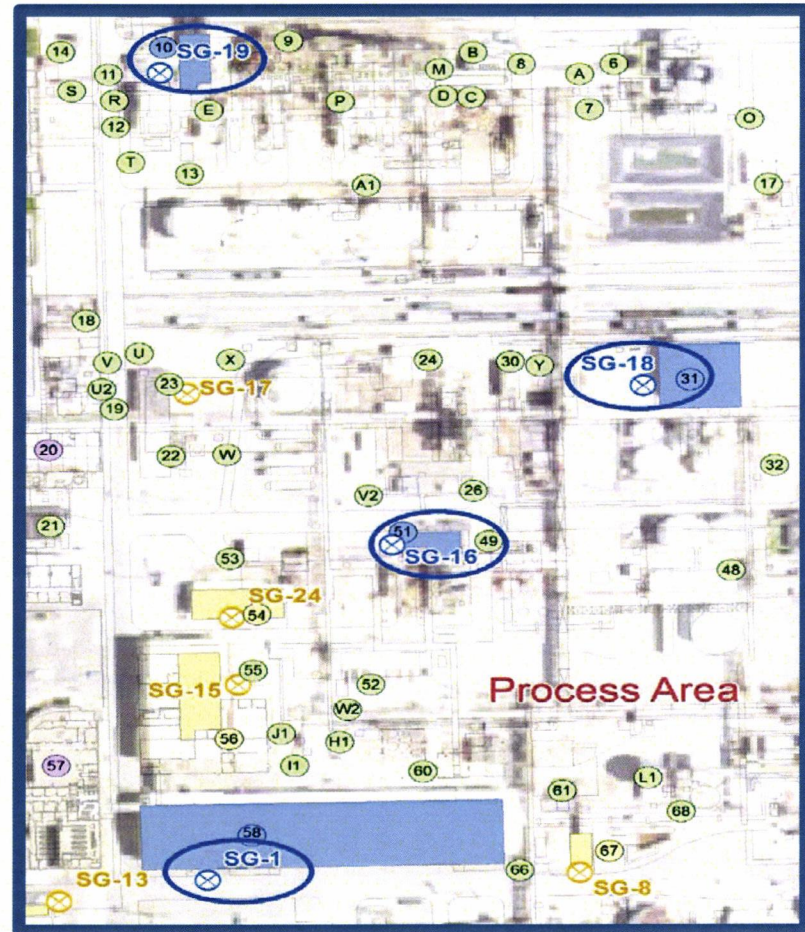
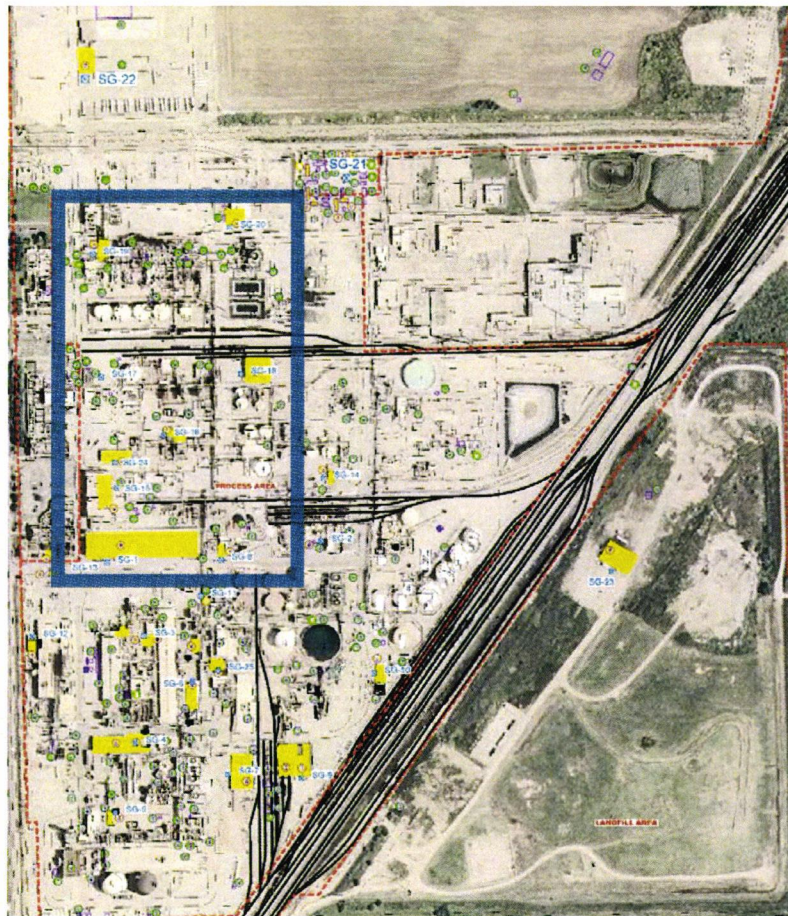
- Detected Chloroform Concentrations Slightly Exceed Conservative Generic Risk-Based Criteria
- Cumulative cancer risk and non-cancer hazard index (HI) estimates for indoor exposure are less than  $1 \times 10^{-5}$  and 1, respectively (assuming the building is not subject to OSHA in the future)
- Potential Sources Include:
  - On-Going Operations
  - Bleach-Containing Cleaning Solutions
- **System Working As Planned – No Further Action at ICM Buildings**



# On-Site Soil Gas – Data Collection & Screening

- Site Soil in Sample Zones is Silty Clay
- Detected Chemicals/Degradation Products are/were Detected in more than 1 Location
- All Detected Chemicals in Soil Gas Are Below Screening Criteria Protective of Occupational Indoor Air Exposures, except:
  - Carbon tetrachloride and chloroform at [SG-1](#)
  - Carbon tetrachloride, chloroform, hexachloroethane, and tetrachloroethene at [SG-16](#)
  - Chloroform at [SG-18](#) and [SG-19](#)
- Cumulative cancer risk and non-cancer HI estimates could be greater than  $1 \times 10^{-5}$  and 1, respectively (assuming building is not subject to OSHA)

# On-Site Soil Gas Sample Locations





# On-Site Soil Gas Sample Screening

All units in µg/m³

Volatile Organic Compounds	On RTK List	Manufactured	Used	EPA IA RSLs (TR = 1E-06, HI=0.1)	EPA IA RSLs (TR = 1E-05, HI=1)	OSHA PELs	Cal/OSHA PEL: 8-hr. TWA	SG-1 12/2/2016	SG-1 2/9/2017	SG-16 12/2/2016	SG-16 2/10/2017
1,1,1-Trichloroethane				73,000	730,000	63,333,333	63,481,936	3,610	4420 J	31000 U	33,200
1,2-Dichloroethane				16	160	6,745,740	134,915	930 U	3700 U	23000 U	8500 U
1,2-Dichloropropane		x		41	410	11,666,667	11,554,192	3,060	2210 J	26000 U	9700 U
Benzene				52	520	1,064,894	1,064,894	730 U	2900 U	18000 U	6700 U
Carbon tetrachloride	x	x		68	680	2,097,069	419,414	3,150,000	4,560,000	20,400,000	18,100,000
Chloroform (Trichloromethane)	x	x	x'	18	180	8,000,000	325,535	1,100,000	811,000	2,000,000	1,100,000
Hexachlorobutadiene				19	190			2500 U	9800 U	61000 U	22000 U
Hexachloroethane				37	370	333,333	322,754	2200 U	8800 U	484,000	20000 U
Methylene chloride	x	x		8,800	88,000		1,720,859	1,260	3200 U	25,400	9,590
Tetrachloroethene		x		580	5,800	22,608,044	5,652,011	551,000	568,000	8,410,000	1,530,000
Trichloroethene				29	290	17,912,747	4,478,187	11,900	10,800	75,200	37,700
Vinyl chloride				93	930		85,208	590 U	2400 U	15000 U	5,960

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Exceeds Regulatory Cal/OSHA PEL 8 hr. TWA



# On-Site Soil Gas Sample Screening

All units in µg/m³

Volatile Organic Compounds	On RTK List	Manufactured	Used	EPA IA RSLs (TR = 1E-06, HI=0.1)	EPA IA RSLs (TR = 1E-05, HI=1)	OSHA PELs	Cal/OSHA PEL: 8-hr. TWA	SG-18 12/5/2016	SG-18 12/5/2016 (Duplicate)	SG-19 12/5/2016	SG-19 2/10/2017
1,1,1-Trichloroethane				73,000	730,000	63,333,333	63,481,936	9,000	9,000	2700 U	650 U
1,2-Dichloroethane				16	160	6,745,740	134,915	23900	33100	2000 U	490 U
1,2-Dichloropropane		x		41	410	11,666,667	11,554,192	1150 J	1710 J	2300 U	550 U
Benzene				52	520	1,064,894	1,064,894	783 J	716 J	1600 U	311 J
Carbon tetrachloride	x	x		68	680	2,097,069	419,414	296,000	289,000	248,000	152,000
Chloroform (Trichloromethane)	x	x	x'	18	180	8,000,000	325,535	453,000	453,000	1,010,000	387,000
Hexachlorobutadiene				19	190			5200 U	5400 U	5300 U	1300 U
Hexachloroethane				37	370	333,333	322,754	4700 U	4900 U	4800 U	1100 U
Methylene chloride	x	x		8,800	88,000		1,720,859	2,990	3,580	2,570	670
Tetrachloroethene		x		580	5,800	22,608,044	5,652,011	433,000	430,000	73,200	30,300
Trichloroethene				29	290	17,912,747	4,478,187	37,100	38,200	6,990	3,280
Vinyl chloride				93	930		85,208	17,300	16,700	1300 U	310 U

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Exceeds Regulatory Cal/OSHA PEL 8 hr. TWA

# On-Site Soil Gas – Additional Evaluation

- Further Evaluate Structures at the Four Locations Where Occupational-Based Criteria Were Exceeded:
  - Use of specific chemicals
  - Building construction
  - Potential preferential migration pathways
  - Whether the current structure already “mitigated” through HVAC
- Calculate soil gas attenuation factors for buildings?
- Additional data are necessary or appropriate?
- Evaluate need for corrective measures in the CMS

# Off-Site Soil Gas – Analytical Results

- Two Rounds of Sampling at 4 Locations
- December 2016 results:
  - Low or non-detect
  - No laboratory errors/contamination identified
  - Certain concentrations exceed conservative generic risk-based criteria
  - Cumulative cancer risk and non-cancer HI estimates less than  $1 \times 10^{-5}$  and 1, respectively
- February 2017 results:
  - Results up to five (5) orders of magnitude greater than in December 2016
  - No laboratory errors/contamination identified
  - Two sample locations have the potential for significant exposure



# Summary of Current Off-Site Residential Soil Vapor Data

All units in  $\mu\text{g}/\text{m}^3$

Volatile Organic Compounds	EPA IA RSLs (TR = 1E-06, HI=0.1) a	EPA IA RSLs (TR = 1E-05, HI=1) b	EPA IA RSLs (TR = 1E-05, HI=1) $b \times 2 = c$	Estimated MW10S3	Measured SG-29 12/1/2016	Measured SG-29 2/10/2017
1,1,1-Trichloroethane	17,000	170,000	340,000	222	1.1 U	4.4 U
1,2-Dichloroethane	3.6	36	72	15	0.81 U	3.2 U
Benzene	12	120	240	71	0.67	2.2 J
Carbon tetrachloride	16	160	320	357	1.3 U	617
Chloroform (Trichloromethane)	4.1	41	82	48.35	0.78 J	703
Chloromethane (Methyl chloride)	310	3,100	6,200	137	0.66	1.7 U
Methylene chloride	2,100	21,000	42,000	44	5.2	2.8 U
Tetrachloroethene	140	1,400	2,800	208	0.38	936
Trichloroethene	7	70	140	122.5	0.24	21
Vinyl chloride	5.6	56	112	425	0.51 U	2.0 U

X' = possibly present in indoor air due the use of bleach cleaners

Exceeds OSHA EPA IA RSLs (TR = 1E-05, HI=1)  $b \times 2 = c$



# Summary of Current Off-Site Residential Soil Vapor Data

All units in  $\mu\text{g}/\text{m}^3$

Volatile Organic Compounds	EPA IA RSLs (TR = 1E-06, HI=0.1) a	EPA IA RSLs (TR = 1E-05, HI=1) b	EPA IA RSLs (TR = 1E-05, HI=1) $b \times 2 = c$	Estimated MW143 S2/S3	Estimated MW21S3	SG-26 12/1/16 15 ft. bgs.	SG-26 2/10/17 15 ft. bgs.	SG-27 12/1/16 15 ft. bgs.
1,1,1-Trichloroethane	17,000	170,000	340,000	222	222	1.1 U	1.1 U	1.1 U
1,2-Dichloroethane	3.6	36	72	15	15	0.81 U	0.81 U	0.81 U
Benzene	12	120	240	71	71	0.64 U	0.64 U	0.14 J
Carbon tetrachloride	16	160	320	3,355.8	9,853.2	2	212	0.61 J
Chloroform (Trichloromethane)	4.1	41	82	261.09	58.02	1	28	0.63 J
Chloromethane (Methyl chloride)	310	3100	6,200	137	137	0.41 U	1.0	0.41 U
Methylene chloride	2,100	21,000	42,000	44	44	0.56 J	0.69	0.76
Tetrachloroethene	140	1,400	2,800	208	208	505	348	3.6
Trichloroethene	7	70	140	122.5	122.5	0.51	5.3	0.21 U
Vinyl chloride	5.6	56	112	425	425	0.51 U	0.51 U	0.51 U

X' = possibly present in indoor air due the use of bleach cleaners

Exceeds OSHA EPA IA RSLs (TR = 1E-05, HI=1)  $b \times 2 = c$



# Summary of Current Off-Site Residential Soil Vapor Data

All units in  $\mu\text{g}/\text{m}^3$

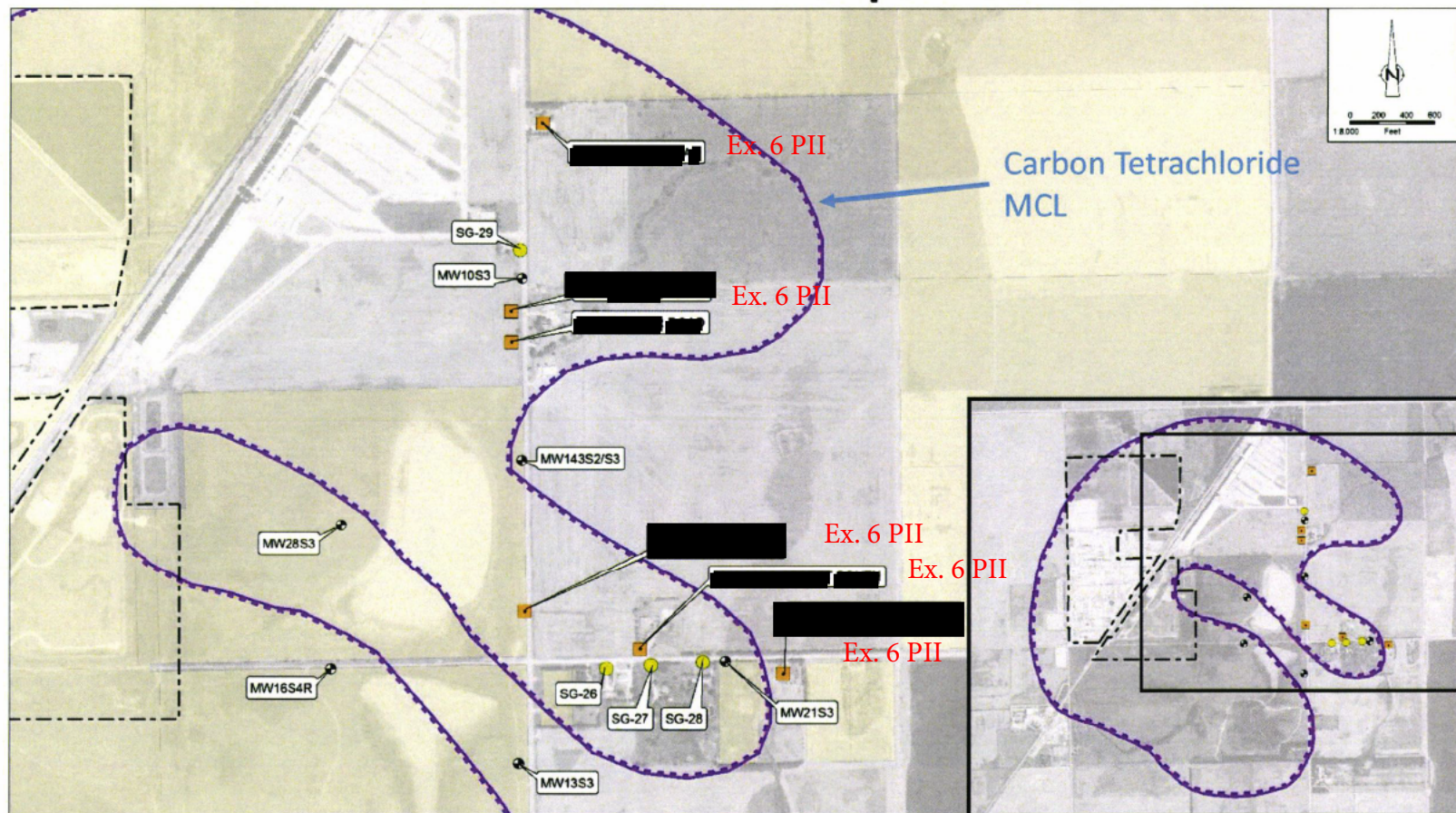
Volatile Organic Compounds	EPA IA RSLs (TR = 1E-06, HI=0.1) a	EPA IA RSLs (TR = 1E-05, HI=1) b	EPA IA RSLs (TR = 1E-05, HI=1) b x 2 = c	Estimated MW143 S2/S3	Estimated MW21S3	SG-27 2/10/17 15 ft. bgs.	SG-27 2/10/17 15 ft. bgs (Duplicate)	SG-28 12/1/16 15 ft. bgs.	SG-28 2/10/17 15 ft. bgs.
1,1,1-Trichloroethane	17,000	170,000	340000	222	222	4.7	1.1 U	1.1 U	650 U
1,2-Dichloroethane	3.6	36	72	15	15	0.81 U	0.81 U	0.81 U	490 U
Benzene	12	120	240	71	71	0.35 J	0.64 U	0.64 U	380 U
Carbon tetrachloride	16	160	320	3,355.8	9,853.2	138	8.8	3.6	86,800
Chloroform (Trichloromethane)	4.1	41	82	261.09	58.02	39	1.2	0.98 U	4,420
Chloromethane (Methyl chloride)	310	3100	6200	137	137	0.41 U	0.41 U	0.41 U	250 U
Methylene chloride	2,100	21,000	42,000	44	44	1.6	0.63 J	0.69 U	420 U
Tetrachloroethene	140	1,400	2,800	208	208	158	27	1.4	130,000
Trichloroethene	7	70	140	122.5	122.5	3.2	0.27	0.21 U	597
Vinyl chloride	5.6	56	112	425	425	0.51 U	0.51 U	0.51 U	310 U

X' = possibly present in indoor air due the use of bleach cleaners

Exceeds OSHA EPA IA RSLs (TR = 1E-05, HI=1) b x 2 = c



# Off-Site Soil Gas Sample Locations





# Off-Site Soil Gas – Data Evaluation

- Variability in Sampling Events (beyond seasonal variability)
- Groundwater Only Source of Off-Site Impacts
- Groundwater Data in Adjacent MWs to Determine Potential Soil Gas Concentrations using Henry's Law
- Collect Two Additional Rounds of Sampling Data:
  - Each of the four locations
  - First round collected on Wednesday April 12, 2017
  - Second round to be collected ~ 4 weeks later
- Evaluate Need for More Data or Corrective Measures

## VI Summary

- Administration Building ICM is Effective & Becomes Final CM
- Four Additional Structures in Facility May be Included in CMS
- Further Evaluation of Off-Site Soil Gas

# Human Health Risk Assessment

- ICMs currently in place are effectively interrupting exposure pathways for potential receptors
- The Final CMs within Exposure Areas will Interrupt Potential Receptor Exposure to soil, groundwater, and soil vapors
- Appendix will include On-Site VI & Indoor Air Investigation Summary

# Anticipated Near-Term RCRA Schedule

- Revised HHRA to EPA ~ May 15, 2017
  - On-Site Soil Gas and Indoor Air Summary Included as Appendix
- CMS Report to EPA ~ July 13, 2017
  - Soil, Groundwater, DNAPL and Vapor Intrusion (On-Site)
- Off-Site Soil Gas Data Collection
  - Additional Sampling April/May 2017
  - Data Evaluation and Follow-up with EPA July 2017



# Summary

- Administration Building ICM is Effective & Becomes Final CM
- Four Additional Structures in Facility May be Included in CMS
- Corrective Measures Assume Future Use = Current Use at Facility
- Soil Cleanup Goals Developed for Shallow Soils
- Groundwater Cleanup Goals will Remain as MCLs
- Further Evaluation of Off-Site Soil Gas